Microbes referred to as Maruts in Yajurved

Fertile Soil Science in Yajurved17.1

यजु17/1

अश्मन्नूर्जं पर्वते शिश्रियाणामद्भ्यSओषधीभ्यो वनस्पतिभ्यो

S अधि सम्भृतं पय:|

तां न Sइषमूर्जं धत्त मरुत: सँरराणा Sअश्मँस्ते क्षुन्मयि

तSऊर्ग्यं द्विष्मस्तं ते शुगृच्छतु || यजु17/1

दयानंद पदार्थ :-हे (संरराणाः) सम्यक् दानशील (मरूतः) वायुओं के तुल्य क्रिया करने में कुशल मनुष्यो! तुम लोग (पर्वते) पहाड़ के समान आकार वाले (अश्मन्) मेघ के (शिश्रियाणाम्) अवयवों मेंस्थिर बिजुली तथा (ऊर्जम्) पराक्रम और अन्न को (नः) हमारे लिये (अधि, धत्त) अधिकता से धारण करो और (अयः) जलाशयों (ओषधिभ्यः) जौ आदि ओषधियों और (वनस्पतिभ्यः) पीपल आदि वनस्पतियों से (सम्भृतम्) सम्यक् धारण किये (पयः) रसयुक्त जल (इषम्) अन्न (ऊर्जम्) पराक्रम और (ताम्) उस पूर्वोक्त विद्युत् को धारण करो। हे मनुष्य! जो (ते) तेरा (अश्मन्) मेघविषय में

(ऊर्क्) रस वा पराक्रम है, सो (मयि) मुझ में तथा जो (ते) तेरी (क्षुत्) भूख है, वह मुझ में भी हो अर्थात् समान सुख-दुःख मान के हम लोग एक दूसरे के सहायक हों और (यम्) जिस दुष्ट को हम लोग (द्विष्मः) द्वेष करें (तम्) उसको (ते) तेरा (शुक) शोक (ऋच्छतु) प्राप्त हो॰1॰

दयानंद भावार्थ:- मनुष्यों को चाहिये कि जैसे सूर्य्य जलाशय और ओषध्यादि से रस का हरण कर मेघमण्डल में स्थापित करके पुनः वर्षाता है, उससे अन्नादि पदार्थ होते हैं, उसके भोजन से क्षुधा की निवृत्ति, क्षुधा की निवृत्ति से बल की बढ़ती, उससे दुष्टों की निवृत्ति और दुष्टों की निवृत्ति से सज्जनों के शोक का नाश होता है, वैसे अपने समान दूसरों का सुख-दुःख मान, सब के मित्र होके, एक-दूसरे के दुःख का विनाश करके, सुख की निरन्तर उन्नति करें॰1

व्यावहारिक अर्थ:-**मरुत: संरराणा :** O Maruts, providers of bounties of food etc in plenty मरुत जो सब पौष्टिक आहार आदि का प्रबन्ध कराते हैं**अश्मन्नूर्जं पर्वते :** Minerals held by cohesive forces in rocks on the mountains. आंतरिक आकर्षण शक्ति से आपस में बन्ध कर पत्थर जो चट्टानो के रूप मे पर्वतों पर विद्यमान हैं **शिश्रियाणामद्भ्य:** Disintegrate them in to constituting particles (to chelate them in to liquids)

ओषधीभ्य: वनस्पतिभ्य: **For herbs and vegetation (medicines and food)**
ओषधि वनस्पति आहार

अधि सम्भ्रतं पय: The liquids and waters to provide nourishment like cow's milk अधिकता से सम्यकता से समान रूप से सब को पोषन देने वाला पय(गोदुग्ध जैसा पान करने हेतु)

तां इषं ऊर्जं न: धत्त: Provide for our food and energy हमें अधिकता से अन्न, बल, पराक्रम की ऊर्जा प्रदान करने वाले पदार्थ

अश्मन् ऊर्कं मयि ते क्षुत् All consuming fire may satisfy its hunger so मेघॉं से भी वर्षा के (वनस्पतियो की उन्नति के लिए जो रस मिलताहै) हमारी भूख मिटाएं

ते शुक् तं यं द्विष्म: your wrath may consume the enemies, the pathogens तुम्हारा रोष हमारे शत्रुओं को नष्ट करे. (हमारे आहार के विष तत्व रूपि हमारे शत्रुओं से सुरक्षा)

O Maruts disintegrate the rocks on the mountains in to their particles(which are held to gather by cohesive energy in the stones) to 'chelate them in to liquids for the enrichment of waters, vegetation and herbs, like the nutrient providing milk from a cow. The 'havi' provided is for the fire to consume, to provide its essence through Maruts to us, and for destroying the 'germs' inimical to us, ie disease and pests of the crops.
Disintegration of rocks on the mountains is known to be caused by the microorganisms by their penetrating the rocks. The broken down 'dust' of the rocks forms the alluvial soil, which is brought down by the streams and rivers from the mountains in to the plains as ever replenished fertile new soil, in which all the vegetation grows.

The mineral particles in the soil are further acted upon by the microorganisms present in the soil and the water particularly the

rain waters, when used for irrigation, 'chelate' converts the mineral particles of soil in to liquid for for the root system of the vegetation to receive the nutrition for the growth of vegetation. All organically grown product is immune to pests and disease. This also incidentally applies to those who consume organic products.

Y17.2 Numbers Population

यजु17।2

इमा मे ऽअग्न ऽइष्टका धेनव: सन्त्वेका च दशच दश च शतं च शतं च सहस्त्रं च सहस्त्रं चायुतं चायुतं च नियुतं च नियुतं च प्रयुतं चार्बुदं च न्यर्बुदं च समुद्रश्च मध्यं चान्तश्च परार्द्धश्चैता मेऽ अग्नऽ इष्टका धेनव:सन्त्वमुत्रामुष्मिल्लोके।।यजु ।।17।2

व्यावहरिक अर्थ:-

अग्न इमा: इष्टका: मे धेनव: सन्तु ----The above building blocks may be like cows to me

सन्त्वेका च दश like one to ten च दश ten tens=100 **शतं च शतं च सहस्त्रं** ie=10,000=10^4 ten thousands(here it may kindly be noted that according to this Yajurved mantra Sahasra is ten thousand and not one thousand as normally taken in popular arithmetic)**च सहस्त्रं च सहस्त्रं चायुतं**=10^8 **चायुतंच नियुतं**= 10^{16}**च नियुतं च प्रयुतं**=10^{32}**चार्बुदं** = 10^{64} **च न्यर्बुदं** =10^{128} **च समुद्रश्च**=10^{256} **मध्यं** being the mid ocean **चान्तश्च**=10^{512} **पराध्द्श्चैता** to outer space.

ऐता: इष्ट: अमुत्र च अमुश्मिन्नलोके मे धेनव:सन्तु So many of these building blocks from this world and outer space, may be like cows to fulfill my needs

Microbiology is indeed a very new science. According to ASM American Society of Microbiology in Frontiers of microbiology BSCS2006"The sheer number of microbes on earth is staggering. It has been estimated that we share the planet with $5X10^{31}$ microbes, which weigh more than 50 million quadrillion tons, constituting nearly 90% of earth's mass.

The various properties of maruts ie being live organisms, having many different colours, shapes, sizes, being sensitive to optics, sonic and electromagnetic fields, capable of gene transfer, and voracious eaters, growing in numbers exponentially, being probiotic and pathological ie disease bearing and also antibiotic in character are properties associated with maruts in vedas. The large numbers of these *ishtakas* building blocks like bricks that Vedas are saying could be related to the microbes in the entire universe.

This second mantra is the key to the suggestion that maruts are indeed related to microorganisms of all kinds, which the modern science is yet in the process of identifying and studying.

Note. The Vedic system of numbers is a very clear strategy to use squares after ten, ten tens ie hundred, hundred hundreds ie ***Sahasra*** **again *Sahasra Saht shatam ie* squared and then the resulting number is called *AYUTAM.* An *Ayuta* is a square and so on. Thus the Vedic system deals with numbers far beyond the concepts of modern number systems.**

Cow& Milk Production Yaju 17.3

यजु 17।3

ऋतव:स्थऽऋतावृधऽऋतुष्ठा: स्थऽऋतावृध:। घृतश्च्यतो मधुश्च्यतो विरजो नाम कामदुधाऽक्षीयमाणा:।।

व्यावहरिक अर्थ:-

ऋतवृध: ऋतव: स्थ------Stable system of season wise provision

ऋतावृध: ऋतिष्ठा:------attaining their growth according to the seasons

घृतच्युत: मधुश्च्युत: विराज: नाम कामदुधा: अक्षीयमाणा: स्थ ----providing the sweetness and nutritive bounties like a cow fulfilling all our desires and not causing any harms to us.

These are the working of microorganisms in providing fruits, vegetables and cereals of nutritive quality, sweetness and flavors according to seasons by working through soil, irrigation and atmospheric actions

Thus these useful microorganisms perform the functions of the proverbial cow *KAMDHENU* by working through vegetative worlds to meet all our desires.

Lest there is an impression given by this mantra, that these microbes function only in the botanical world, there are ample reference in Vedas, to the functioning of the microbes by the action of enzymes in the production of milk in cows by the action in rumens and the digestive assimilation of our food through our intestines in working of

fermentation in food products in human body etc.

Thermophilic Microbes Y17.4 Oceanic Microbial action

यजु 17।4

समुद्रस्य त्वावकयाग्ने परि व्ययामसि !
पावको अस्मभ्यँ शिवो भव !! यजु 17.4

व्यावहरिक अर्थ:- (अग्ने) अग्नि के तुल्य तेजस्वी सभापति, हे मरुतो माइक्रोब्स अग्नि के समान सदैव प्रभाव शाली तुम (समुद्रस्य) आकाश के बीच, सम्पूर्ण ब्रह्माण्ड में, समुद्र मे, आकाश मे, भूमि के धरातल के नीचे (अवकया) जिस से रक्षा करते हैं उस क्रिया के साथ वर्तमान, हमारे विकास ,पालन पोषण,संरक्षण के लिए (त्वा)आप को, मरुतो माइक्रोब्स को (परि,व्ययामसि) सब ओर से प्राप्त होते हैं वैसे (पावक) पवित्र कर्ता आप (अस्मभ्यम्) हमारे लिए (शिव) मंगलकारी (भव) हूजिए

(MODERN SCIENCE ON MICROBES UNDER SEA : On ocean floor under water geysers, were discovered in 1977. Seawater is sucked in to cracks in ocean floor,

where it encounters molten rocks-magma of under water volcanoes. The hot magma super heats the seawater which is forcibly discharged back in to ocean through thermal vents. When superheated mineral rich sea water meets the super freezing temperature on ocean floor, minerals precipitate out of sea water and their deposits form tall chimney like structures. These are called Hydrothermal underwater vents. A wide variety of organisms live near these vents.

Modern science today recognises that Bacteria rather than the plants are the producers and initiate the food chain in this ecosystem.

Microbes living at the high temperatures

Modern science of geochemistry in rhizosphere, is investigating how the microbes in the roots of plants in marshes and under sea, act upon the possible locations for the origin of life, including tide pools and hot springs. However, recently some scientists

have narrowed in on the hypothesis that life originated near a deep sea soil to release

Where did life originate?

A hydrothermal vent at the bottom of the ocean

Scientists are exploring several hydrothermal vent. The chemicals found in these vents and the energy they provide could have fueled many of the chemical reactions necessary for the evolution of life. Furthermore, using the DNA sequences of modern organisms, biologists have tentatively traced the most recent common ancestor of all life to an aquatic microorganism that lived in extremely high temperatures — a likely candidate for a hydrothermal vent inhabitant! Although several lines of evidence are consistent with the hypothesis that life began

near deep sea vents, it is far from certain: the investigation continues and may eventually point towards a different site for the origin of life.

Modern science of geochemistry in Rhizosphere, is investigating how the microbes in the roots of plants in marshes and under sea, act to release oxygen, to pick up various mineral elements from the sludge and sediments, to harvest and store them in the plants and thus leave the soil clean and free of polluting minerals. In fact sea weeds are the primary source of the modern day precious element Magnesium.

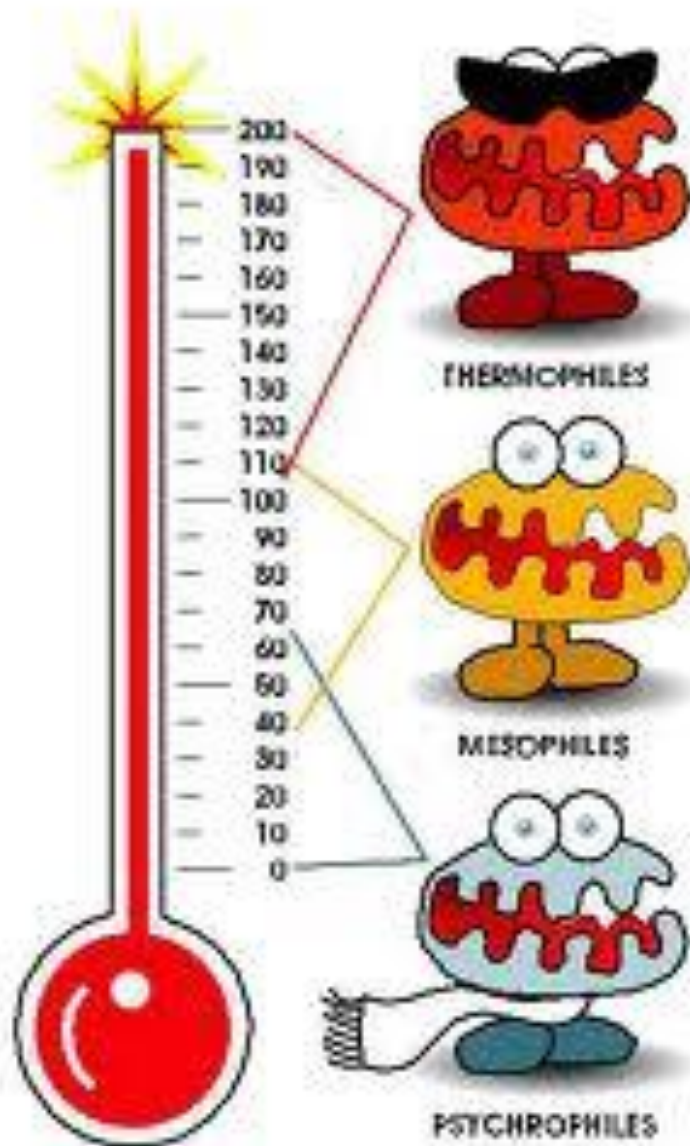
The oceans by their overpowering all enclosing actions through phytobacteria, clouds, winds, marine life, algae , corals, krill, fish, minerals and immense inexhaustible source of such known and unknown bounties proceed to clean our ecosystem of pollutants, and provide fertility and nutritive rich rain water for the welfare of humanity.

Modern science of microbiology has traced microorganisms signatures in the snowflakes, being carried from the oceans from where the specific clouds had originated. These microorganism play the principle role in enriching the soil and vegetation by the rains they bring with them selves. The electricity charges carried with the microorganisms by the snow flakes, give rise to atmospheric thunder, which again has a big role in enriching the food cycle, creating nitrogen fixation, and destruction of atmospheric pathogen pollutants by the ozone and UV radiation resulting from thunder & lightning..

It is also noted that only the useful 'probiotics' microorganisms appear

to leave the oceans with the pure water in the clouds forming there. In fact there are Rig Ved Mantras which talk about learning to distinguish good microorganisms from 'bad' ones. This is an area for modern microbiology to yet attempt to explore.

The polluting materials in the oceans are digested by the microorganisms in the oceanic 'soup' to fix as edible forms of algae, corals, krills and marine life, and harvest the polluting metals from the sewage waters.

This is how microorganisms work for our welfare in actualizing Vedic direction of *SHIVO BHAV.*

Y17.5 Sub Zero Temperatures

Psychrophiles - low temperature microbes

यजु 17-5,

हिमस्य त्वा जरायुणाग्ने परिव्ययामसि । पावको ऽ अस्मभ्यं शिवो भव।।Y-17।5

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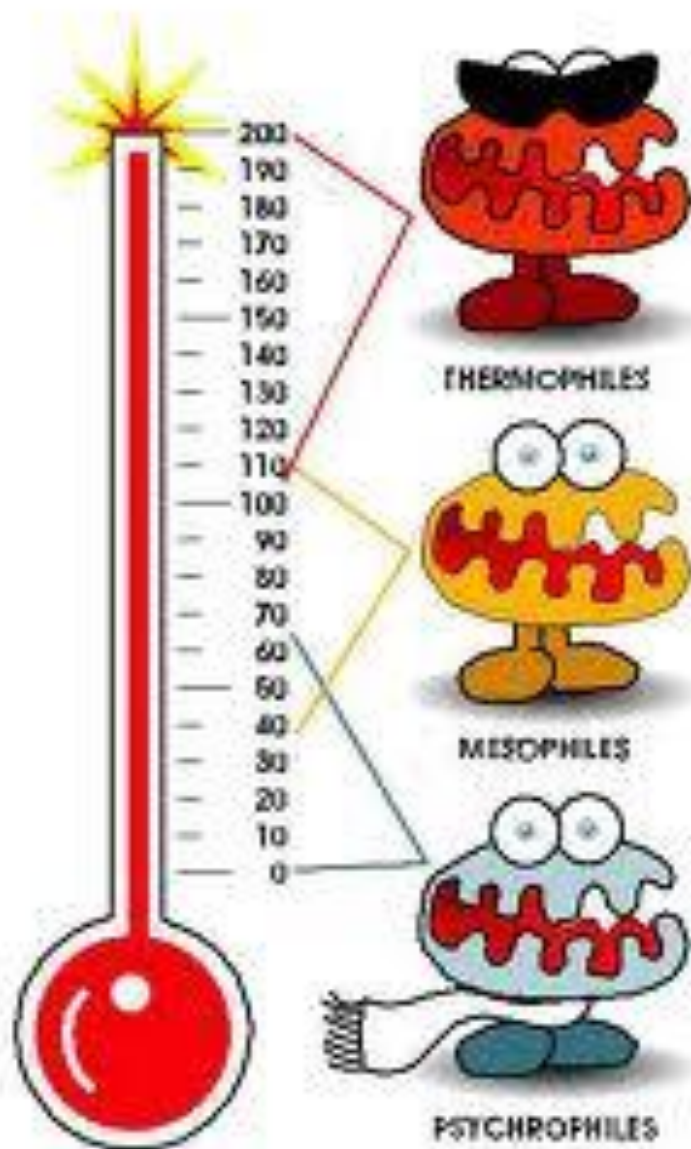
व्यावहरिक अर्थ:- When fully buried under deep snow in cold regions of the earth, all fallen plants and dead bodies, and organic substances, get preserved. The unhealthy malevolent microorganisms of death, decay and diseases, which may have been in them, get destroyed, as if the death of pathogens is caused by sheer old age starvation, and burning by fire.
(Veda is here talking about the phenomenon of preservation at low temperatures, Freeze drying for preservation and cold storage, may not be after all, such modern techniques, when understood and appreciated in Vedic context)

Psychrophiles - low temperature microbes

Bacteria which live in cold conditions are known as psychrophiles. Since so much of our planet is generally cold, i.e. below 5°C, it is not surprising that they are very common amongst a wide variety of habitats. To enable them to survive and grow in cold environments, psychrophilic bacteria have evolved a complex range of adaptations to all of their cellular components, including their membranes, energy-generating systems, protein synthesis

machinery, biodegradative enzymes and the components responsible for nutrient uptake. Whilst such a systems approach to the topic has its advantages, all of the changes can be described in terms of adaptive alterations in the proteins and lipids of the bacterial cell. The present review adopts the latter approach and, following a brief consideration of the definition of psychrophiles and description of their habitats, focuses on those adaptive changes in proteins and lipids, especially those which are either currently being explored for their biotechnological potential or might be so in the future. Such applications for proteins range from the use of cold-active enzymes in the detergent and food industries, in specific biotransformations and environmental bioremediations, to specialized uses in contact lens cleaning fluids and reducing the lactose content of milk; ice-nucleating proteins have potential uses in the manufacture of ice cream or artificial snow; for lipids, the uses include dietary supplements in the form of polyunsaturated fatty acids from some Antarctic marine psychrophiles

Y17.6 Grey Water Purification

उपज्मन्नुप वेतसेऽवतर नदीष्वा । अग्ने पित्तमपामसि मण्डूकि ताभिरागहि सेमं नो यज्ञं पावकावर्णं शिवं कृधि।।यजु 17।6।।

व्यावहरिक अर्थ:-

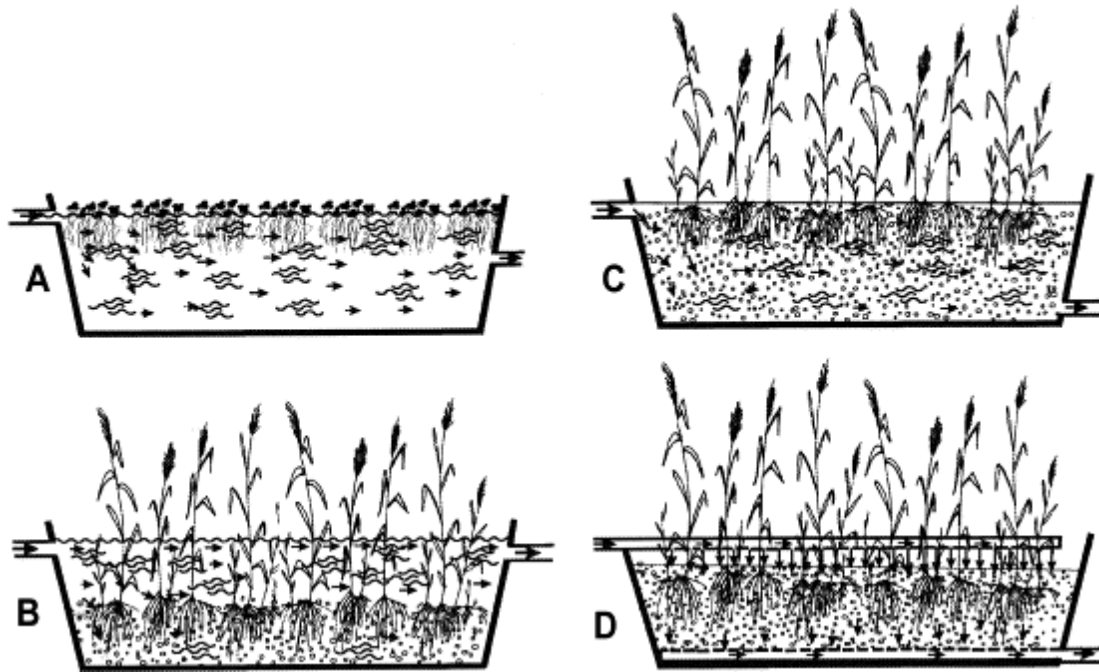
अग्ने पित्तं आपसि------ pitta and agni ie fever in water is polluted water

मण्डूकि ताभिरागहि-----marine life like frogs & fish family, get at that

उपज्मन्नुप वेतसेऽवतर नदीष्वा ----growing plants of cane reed family which are secondary crops (crops not fit for direct human consumption, but use as biomass and if fit cattle fodder etc.) in the beds of streams of such water .

सा इमं अस्माभि यज्ञं पावकवर्णं शिव: भव -----may provide uswith means to purify the polluted water for our welfare.

Modern Science researches initiated by NASA in USA finally developed the most environments friendly process to treat pollutes waters called grey waters by process almost identical to what this Ved Mantra has prescribed. The grey water is first led in to wet lands with plenty of marine life to digest the organic pollutants. Next this water is led in to lagoons in which reed family of plants purify this water by photo remediation, Subsequently this water is led through lagoons with energy crops. These are special plant species that harvest specific variety of hard metal pollutants like Lead, Cadmium etc. there are specific plants that naturally harvest commercially important metals such as Magnesium.

These processes are shown in pictures given here.

This happens to be the most recent modern strategy to treat
sewage and polluted waters The Polluted water is run in to ponds with
frogs, fish like marine life, and then this marine life treated water is run in to
streams. On the beds of these streams plants of cane & reed family are
grown. The final run off water is clean water.
"Growing Clean Waters"by the NASA scientist Dr Wolverton.
Modern science is also growing special plants in polluted
waters, for harvesting to extract specific minerals

Microbes Multi colors Multishapes

यजु24।14

कृष्णग्रीवा आग्नेया बभ्रव: सौम्याऽउपध्वस्ता: सविता वत्सतर्य: सारस्वत्य: श्यामा: पौष्णा: पृश्नयो मारुता बहुरूपा वैश्वदेवा वशा द्यावापृथिवीया:।।यजु 24.14।।

व्यावहरिक अर्थ:-

कृष्ण -ग्रीवा------With black necks

आग्नेया -------colour of burning amber

बभ्रव: सौम्या: ---mild brown coloured

ऽउपध्वस्ता: ------staying close to each other

साविता ----------golden colour bright like sun

वत्सर्या: सरवस्वत्य:-------the young ones

श्यामा: पौष्णा:----------dark coloured providers of nutrition

पृश्नयो -----------of midget sizes

मारुता बहुरूपा ----Microorganisms have multi shapes and looks

वैश्वदेवा वशा -----Under control of wise and learned men

द्यावापृथिवीया: -----For the betterment of earth and space

The microorganisms have multiple shapes, are multicolored.

They with black necks, Fire red colored, brown, golden sun like complexion. The dark ones are probiotic providing nutrition, and are in smaller sizes and tend to flock together. These microorganisms can be manipulated and controlled by wise men to bring bounties to the world.

Y25.06 Biotechnology in Vedas

यजु 25-06

मरुतांस्कन्धा विश्वेषां देवानां प्रथमा कीकसा रुद्राणां द्वितीयादित्यानां तृतीय वायोः

पुच्छमग्नीषोमयोर्भासदौ क्रुञ्चौ श्रोणिभ्यामिन्द्रा बृहस्पती ऊरुभ्यां मित्रावरुणावल्गाभ्यामाक्रमणं स्थूराभ्यां बलं कुश्ताभ्याम्।।यजु 25,06

व्यावहरिक अर्थ:-

मरुता स्कन्धा विश्वेषां देवानाम-- Main plank of the microbes are the probiotic

प्रथमा कीकसा रुद्राणां ------First are the antibiotics the destroyers of body disease organisms by antibiotic microorganisms.

द्वितीया दित्यानां -Second the destroyers of pollutants in the environment which are treated by microorganisms for sustainable decomposition

त्रितीया उरुभ्यां -----Third strategy is by sustainable commercial utilization through the third varna strategies of Vaishyas, by sustainable commercial operations.

These involve the following..

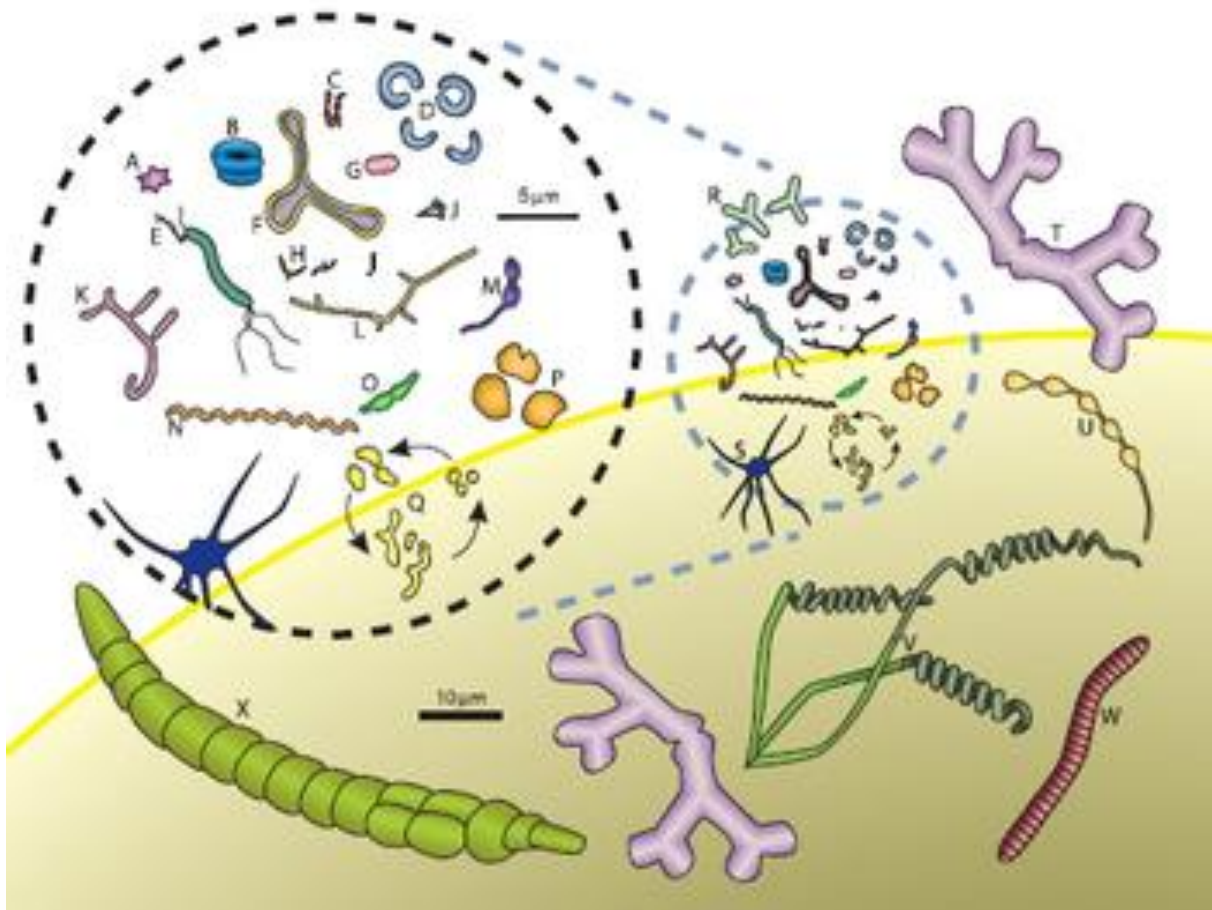
वायो: मित्रवरुणा वल्गाभ्यामाक्रमणं स्थूराभ्यां बलंकुष्ठाभ्याम्-------of wind and Bio gas energies

पुच्छम् अग्नीषोमयोर्भासदौ-- on the frontiers of visible life systems the Solar Energy

क्रुञ्चौ श्रोणिभ्यां इन्द्राबृहस्पती-----------Aquatic birds and marine life (In Japan these are used to help in paddy like crops)and excreta for promoting agriculture through microbial compost actions

The mantra stipulates the all encompassing role of microorganism to be the main plank on which by the action the friendly microorganisms, referred to as probiotic perform their functions for directly promoting all biological life and nutrition.

Secondly Microbes play their most significant role as antibiotics in controlling diseases (Pathogens) , in controlling enemies of the ecology the pollutants, by modern microbial waste and sewage disposal techniques in (Rudra form) .

Thirdly by actions through the third *varna the Vaishyas* by sustainable commercial strategies of utilising windenergy, Biogas and solar energies and then utilising the other life and microorganisms to promote agricultural activities for welfare of all.

Gut Microflora & Sperms Yajurved 25.07

यजु 25।07

पूषणं वनिष्ठुनाऽन्धाहीन्त्स्थूलगुदया सर्पान्गुदाभिर्विह्रुत आन्त्रैरपो वस्तिना वृषणमाण्डाभ्यां वाजिनं शेपेन प्रजां रेतसा चाषान् पित्तेन प्रदरान् पायुना कूश्माञ्छकपिण्डे:।।यजु 25.07

व्यावहरिक अर्थ:-

पूषणं ---------------The healthy digestive system

वनिष्ठुना स्थूल गुदया----intestine work to produce well formed stools

अन्धाहीन सर्पान गुदाभिर्विह्वत आन्त्रैरपोवस्तिना----from intestines producing watery stools, exit blind snake like creatures

वृषणमाण्डाभ्यां वाजिनं शेपेन रेतसा प्रजां------From well formed healthy testicles through male organ the sperms produce good progeny

चाषान---------- from various foods

प्रदरान----------in the stomachs

पायुना-----------intestinal digestive processes

शकपिण्डै: कूश्मान---------produce a healthy body which should be a continuous subject of study and research.

The mantra extols the role played by the microorganisms in processing our food and how healthy body is reflected in the proper functioning of our digestive system, and its role in maintaining the

sperm counts to ensure good healthy progeny, and the healthy body to provide the frame work for a mind to devote itself to study and research. This mantra also describes the science of well formed stools (shaped resembling a banana according to modern science) as assessment of proper functioning of human digestive system.

Y25.20 Microbes in Environment give healthy body and cattle

यजु25।20

प्ृषदश्वा मरुत: पृश्निमातर: शुभंयावानो विदथेषु जग्मय:।
अग्निजिह्वा मनव: सूरचक्षसो विश्वे नो देवा अवसाग्मन्निह ।।यजु 25.20

व्यावहरिक अर्थ:-

पृषदश्वा---------- strong horses

मरुत: ---------- microbes

पृश्निमातर:--------- who occupy space

शुभंयावानो-------- those who provide welfare and prosperity

विदथेषु ------- fighters of battles with enemies the disease causing pathogens

जग्मय: -------- those who assimilate

अग्निर्जिह्वा ---------those who have fiery tongues

सूरचक्षसो ----those who give birth and create by their mere presence

अवसागमन्निह--- may dwell here with their ability to provide protective shelter

The mantra says that the microorganisms which nurture strong household animals like horses cows etc. These microbes have fiery tongues to battle with diseases and pollutants and digest these undesirable elements to provide us health and welfare. These micrograms grow even in space , giving rise to their activities by their mere presence, and they may make their dwellings in our households.

Y2.21 Cow Milk Probiotics

भारतीय गो दुग्ध -आधुनिक विज्ञान

यजुर्वेद 2-21 के अनुसार

सं वर्चसा पयसा तनुभिरग्नमहि मनसा सं शिवेन ।
त्वष्टा सुदत्रो विदधातु रायो ऽ नुमार्ष्टु तन्वो यद्विलिष्टम ।।

व्यावहरिक अर्थ:-

पयसा- गोदुग्ध द्वारा

वर्चसा - वर्चस्वी बन के

तनुभरग्नमहि- तन मे अग्नि के ओज से परिपूर्ण

मनसा शिवेन - मानसिक शिव संकल्प- अपनी मानसिक शान्ति तथा सब संसार के लिए सद्भावना लिए हुए

त्वष्टा - शिल्प यान्त्रिकी द्वारा

सुदत्रो - कार्य कौशल से

विदधातु - विविध प्रकार के

रायो - धन सम्पन्नता प्राप्त करो

ऽनुमार्ष्टु - स्वयम स्वास्थ्य प्राप्त कर के

तन्वो - अपने तन की

यद्विलिष्टम - जो भी कमियां रोग आदि

आज आधुनिक विज्ञान के अनुसार माता के गर्भ मे पल रहे शिषु के स्वास्थ्य के लिए गर्भवती माता के पौष्टिक आहार का बड़ा महत्व है. जन्मोपरांत स्तन पान का भी महत्व है.

Y3-44 Fermentation

Microbe are Voracious Eaters

यजु 3-44,

प्रघासिनो हवामहे मरुतश्च रिशादस: । करम्भेण सुजोषस: ।।

यजु 3।44।।

व्यावहरिक अर्थ:-

प्रघासिनो- Voracious eaters of (cooked) food **हवामहे-** we exult in glorifying **मरुतश्च-**the maruts the microorganisms **रिशादस:-** destroyers of enemies --killers of pathogens by antibodies to create health giving probiotics **करम्भेण-**by mixture of curd with oat flour -- Yeast as starter **सजोषस:-**with vigour**-**

In context of *Grihasthashram* the topic under context The mantra directly refers to the fermentation process enzyme microorganisms as voracious eaters of food to create health giving contents to our food by growing more microorganisms which modern nutritive science calls as probiotics found in all fermented foods.

Yaju Veda 3-45 Environmental Repair

यद्ग्रामे यदर्ण्ये यत्सभायां यदिनन्द्रिये । यदेनश्चकृमा वयमिदं तदवयजामहे स्वाहा।। यजु 3।45।।

व्यावहरिक अर्थ:-

Whatever wrong actions we have done in habitations, forests, and in communities, we want to rectify that wrong by Agnihotra. .

Y3-46 Rain Making

मो षू ण इन्द्रात्र पृत्सु देवैरस्ति हि ष्मा ते शुष्मिन्नवया:। महिश्चिद्यस्य मीढुषो यव्या हविष्मतो मरुतो वन्दते गी: ।।यजु 3।46।।

व्यावहरिक अर्थ:-

O powerful Indra in these battles, by Operating through Maruts the microorganisms, stay for our welfare, by bringing rains that bring nourishment through foods to us, and do not allow any harms to us. Modern science has confirmed the role of micro organisms Pseudomonas Syringe in precipitation of rains

D Jay Hardy is the founder and CEO of Hardy Diagnostics. He began his career in microbiology as a Medical Technologist in Santa Barbara, California.
In 1980, he began manufacturing culture media for the local hospitals. Today, Hardy Diagnostics is the third largest media manufacturer in the U.S.
To ensure rapid and reliable turn around time, Hardy Diagnostics maintains six distribution centers, and produces over 2,700 products used in clinical and industrial microbiology laboratories throughout the world.

Pseudomonas Syringe : Recent discoveries show that “rain-making bacteria” are more efficient at forming these nuclei than inert particles, due to their larger size and surface area.

Minerals can only orient a few water molecules but bacterial proteins are big and can orient many simultaneously. Ski resorts exploit this property by using attenuated bacteria for the seeding of artificial snow. The older method of seeding clouds with silver iodide has been in use for over 60 years.

Most research to date involves the ability of *Pseudomonas syringae* to serve as the nuclei in the promotion of ice crystals. “Ice-minus bacteria” is a nickname given to a variant of this microorganism. This strain of *P. syringae* lacks the ability to produce a certain surface protein, usually found on wild-type "ice-plus" *P. syringae*. The "ice-plus" protein (Ina protein, "Ice nucleation-active" protein) found on the outer bacterial cell wall acts as the nucleating centers for ice crystals. This facilitates ice formation, hence the designation "ice-plus." The ice-minus variant of *P. syringae* is a mutant, lacking the gene responsible for ice-nucleating surface protein production.

Electron micrograph of *Pseudomonas syringae,* which produces a surface protein that serves as nuclei around which ice crystals form at warmer temperatures than usual.

This lack of surface protein provides a less favorable environment for ice formation. Both strains of *P. syringae* occur naturally, but recombinant DNA technology has allowed for the synthetic removal or alteration of specific genes, enabling the creation of the ice-minus strain.

The introduction of an ice-minus strain of *P. syringae* to the surface of plants causes competition between the strains. Should the ice-minus strain win out, the ice nucleate provided by the wild type *P. syringae* would no longer be present, thus lowering the level of frost development on plant surfaces at normal water freezing temperature (0^{o}C)

Everyone knows that water freezes at 0^{o} C; however few know that ultra pure water (without nuclei forming particles) freezes at -40^{o}C. The ice-forming bacteria increase the temperature at which ice crystals form, thus wreaking havoc for farmers when tender leaves are destroyed by a coating of ice.

In the United States alone, it has been estimated that frost accounts for approximately $1 billion in crop damage each year. As *P. syringae* commonly inhabits plant surfaces, its ice nucleating nature incites frost development at warmer

“…microbes can metabolize and grow in clouds, meaning that the atmosphere may represent an environment for life”

temperatures than 0o C, freezing the buds of the plant and destroying the crop.

Pseudomonas syringae is not the only ice nucleator, but is the most common, and all varieties share a common cell wall protein structure that serves as a scaffold for free-floating water molecules.

The green dots *are P. syringae* bacteria that are suspended in ice. The bacteria provide a surface for water vapor to join and form ice crystals, which later fall to earth as snow or rain.

The discovery of bio-precipitation has many far reaching implications. For example, a reduced amount of bacteria on crops could affect the climate. Because of the bio-precipitation cycle, overgrazing in a dry year could actually decrease rainfall, which could then make the next year even dryer.

Rain-making bacteria have been found around the globe, even in Antarctica. “Previous work has shown that” said Brent Christner, a researcher from Louisiana State University. “It is possible that cloud-borne microbes could ‘turn on’ their ice nuclear proteins in the atmosphere and subsequently be returned to the ground in snow or rain. This is a very exciting possibility that further research could unearth.”

This discovery reminds us once again of the importance of microbes in our environment, even in the sky above us.

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